

Non-invasive in vivo assessment of osteoarthritic articular cartilage: a review on MRI investigations

ABSTRACT

Early detection of knee osteoarthritis (OA) is of great interest to orthopaedic surgeons, rheumatologists, radiologists, and researchers because it would allow physicians to provide patients with treatments and advice to slow the onset or progression of the disease. Early detection can be achieved by identifying early changes in selected features of degenerative articular cartilage (AC) using non-invasive imaging modalities. Magnetic resonance imaging (MRI) is becoming the standard for assessment of OA. The aim of this paper was to review the influence of MRI on the selection, detection, and measurement of AC features associated with early OA. Our review of the literature indicates that the changes associated with early OA are in cartilage thickness, cartilage volume, cartilage water content, and proteoglycan content that can be accurately, consistently, and non-invasively measured using MRI. Choosing an MR pulse sequence that provides the capability to assess cartilage physiology and morphology in a single acquisition and advanced multi-nuclei MRI is desirable. The results of the review indicate that using an ultra-high magnetic strength, MR imager does not affect early OA detection. In conclusion, MRI is currently the most suitable modality for early detection of knee OA, and future research should focus on the quantitative evaluation of early OA features using advances in MR hardware, software, and data processing with sophisticated image/pattern recognition techniques.